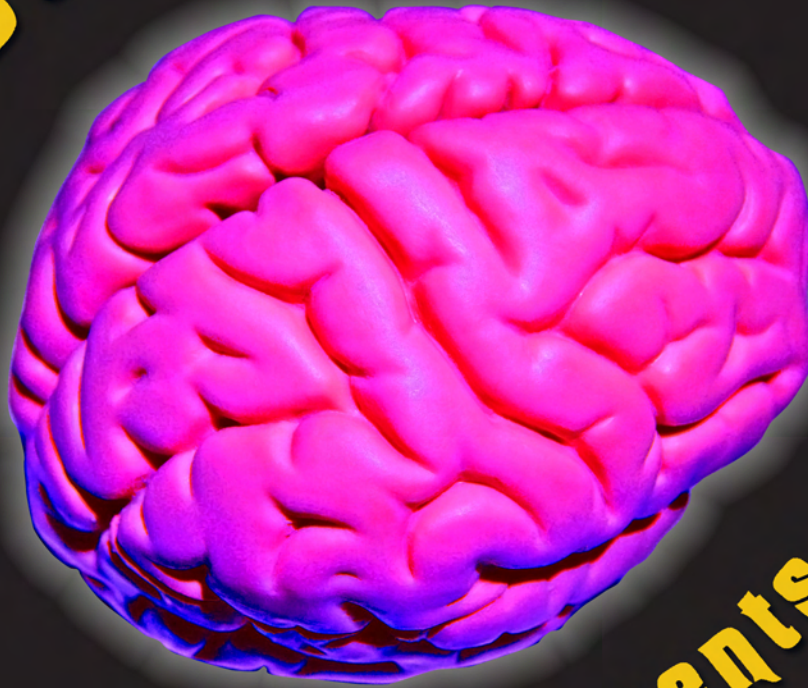


Teacher's Guide
Grades K – 3

“Weird AI”
Yankovic



presents
AL'S BRAIN

A 3-D Journey through the Human Brain

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Introduction



Many people in our community consider Washington state's largest event, the Puyallup Fair, the last hurrah to summer. This year the Fair will be featuring Al's Brain. This free exhibit next to the Planting Patch will take you on an interactive journey through the human brain. There is a 3-D movie in the "Brainitorium" featuring "Weird Al" Yankovic that provides entertaining educational material, as well as interactive Brain Power exhibits from the Pacific Science Center. Since each student receives a complimentary gate ticket to the Fair, teachers may consider offering extra credit to students who bring back the Passport stamped at this exhibit and other educational sites at the Puyallup Fair.



This guide explores the brain through hands-on, inquiry-based activities and lessons for all grade levels. All of these lessons are written to be used with content that will appear in The Seattle Times on September 10, 17 and 24 and are aligned to Washington state science standards.

The guide will appear on both the Newspapers In Education Web site (seattletimes.com/nie) and the Puyallup Fair's Web site (thefair.com) in September. To enroll in The Seattle Times Newspapers In Education program and receive free online newspapers, lesson plans and curriculum guides, as well as the in-paper content for this guide, please e-mail nie@seattletimes.com.

Below you will find a list of the Washington State Science Essential Academic Learning Requirements included in this guide.

Grades K – 1

SYS- A; INQ- A,B,D,F; APP- B,C; LS1- A,D

Grades 2 – 3

SYS- B, C, E; INQ- A, B, E, F; LS3- A

Note to Educators



Activities in this guide are built on knowledge and information provided in the e-Edition of The Seattle Times on September 10, 17 and 24. On each Thursday, you will find a full page of brain-related content in the newspaper. You can visit the Newspapers In Education Web site (seattletimes.com/nie) to find the exact location of these pages in the newspaper. Have students take notes from the in-paper content each week to use in combination with this guide. Teachers are encouraged to modify the guide to fit their individual classrooms. You can easily use the Five E's to structure these lessons.

For more information about neuroscience and additional teaching materials, please visit <http://faculty.washington.edu/chudler/books.html>



Materials:

You will either need to make clay (using the recipe that will be in *The Seattle Times* on September 10, 2009) or provide clay or Play-Doh to your students. Each group will need a little more than four cups (see lesson steps for details). You will also need something like a plastic knife to cut through the clay.

Lesson Steps:

Ideally this lesson will be conducted by having students work in groups of two to four.

First, ask the class how the human brain is different from the brain of a chimpanzee or a cat. What can we do that those animals cannot? What can they do that we cannot? Pass out a bag containing three cups of clay to each group. Explain to your students what a model is and why we use this instead of a real brain.

Encourage your students to examine the clay. Ask the following questions: How soft or hard is it? Do you expect the brain to be as soft? What do we have to protect our brain? Why is clay better to use in this model than a brick might be?

Instruct your students to mold the clay into a shape they think resembles the brain. Once they all have their “brains” made, show them an example of what the brain really looks like using a picture of a real brain and a clay model you have completed. Ask them to share the differences and similarities between their model and yours. If their brain looks different than your model, have the group re-shape theirs to look like yours.

Next, pass out another bag with one tablespoon of clay. Tell them to shape this into a brain as well. This will represent the cat’s brain.

You can repeat the exercise with one cup of clay representing a chimpanzee’s brain. (Make sure you have diagrams of each of these brains available for students to consult.)

Have your students compare the sizes of each brain. They can put them in order from largest to smallest. What does the size of a brain say about abilities, intelligence and functions? Have a class discussion. Also, discuss how this model is like and not like an actual brain.

Look at the amount of folds in pictures of the three brains. Thinking about what things humans, chimps and cats can do, what do your students think the folds help with? (The more folds an animal has, the more neural connections, and the more complex abilities they can perform such as logic, problem solving, reading books and writing stories.) What do you think a chicken brain or a horse brain might look like?

Extension

Have the students cut their human brain models in half and then show the difference between each side of the brain. Ask your students which side of the brain controls which side of your body and then have them explain their reasoning. Instruct one partner to touch the left side of the model brain and the other partner to pick up an object using the side of the body the left brain controls. Which side of the brain did a Puyallup Fair contestant use when he or she designed a blue ribbon quilt?



Materials:

Diagram of the brain including the parietal lobe, The Seattle Times e-Edition.

Lesson Steps:

Why do we stick our fingertips in a pool to figure out the water's temperature? Why don't we use our elbows? Start out by explaining that the parietal lobe is the part of the brain that processes skin sensations of pain, pressure, temperature and texture and that it's connected to the skin with long stringy things called nerves. Nerves go all over our bodies and our skin has nerve endings that sense the world around us.

Instruct students to rub their hands together at a rapid rate until their palms feel warm. Point out the parietal lobe on a model or diagram of the brain and let them know that this activity is stimulating their parietal lobes.

Next, have each student test their parietal lobe by conducting the following activity:

Explain that they will be testing their parietal lobes by pressing different numbers of fingers (1, 2 or 3) on each other's backs and hands. Demonstrate with a willing student how to systematically place varying numbers of fingers on their partner's back, then on their partner's hand (which is held behind their back).

They should vary the number of fingers they use and how far apart their fingers are from each other. Students should first use two fingers held close together and then two fingers held far apart from one another on the student's back. The other partner should report how many fingers he or she feels each time. Then the students should do this on their partner's hand while the partner holds their hand behind their back. Remind students to give firm, but not painful, pressure. Allow two minutes for this exercise and then have them switch roles.

Ask them to report what the challenges were in distinguishing between touches. Was it easier to tell the number of fingers when they were on your back or on your hand? Was it easier when they were held closer together or further apart? What would happen if we did not have a brain? Would we be able to feel at all?



Explanation:

Why do we stick our fingertips in a pool to figure out the water's temperature? Why don't we use our elbows? There are nerves in our skin that send information to the parietal lobe and back again. On our backs these nerve endings are spaced apart somewhat, so that in our exercise we might not feel the difference between one finger and two fingers placed very close together. Other parts of our bodies, like our hands, the soles of our feet and our lips, have nerve endings that are spaced very close together. This way the parietal lobe can receive more accurate information such as how many fingers might be creating the pressure.

Extension

Search The Seattle Times for articles that involve the parietal lobe. As a class, discuss what part of the article shows the parietal lobe being used.

What activities have the students experienced at the Puyallup Fair that require the use of the parietal lobe?



Materials:

Pencil, paper, colored pencils or crayons. More materials are listed within the lesson steps.

Lesson Steps:

Set up a table around your room for each of the five senses. Divide your students into five groups (if you have a larger class you may want to include extra stations). You can also do this activity as a whole class.

For each station, students should examine each item on the table using only that table's sense and describe what they see, touch, smell, hear or taste depending on that table's focus. Then they should compare the items. What is similar? What is different? Be sure to include items that are both similar and different for each display. Here are some examples:

- SIGHT** Examples include: the different sections of a newspaper, markers, crayons, straws, pictures, bags, cups, calendars, etc.
- SOUND** This should be done by the entire class. Arrange for items that make noise (bubble wrap, drums, plastic bags, bells, balled-up newspaper, etc. Also bring in CDs and play different types of music (you could even use one classical song that has slower and faster tempos, loud and soft, smooth and rough sounds, etc.). Have students close their eyes and then play all of these for the kids. Can they hear it better if their eyes are open or closed? Why do they think that is?
- TOUCH** Items could include: burlap, plastic, bubble wrap, cotton balls, coffee grounds, beans, marbles, paper, etc.
- SMELL** Include items with varying smells such as coffee grounds, cereal, newspaper, mint, Kool-Aid, Play-Doh, lemon, shaving cream, pudding, vanilla, popcorn, etc.
- TASTE** Bring in food items for students to try, but be very careful if any students have allergies. Examples could include carrots, sugar, pudding, cereal, salt, milk, etc. Have students taste an item while holding their nose closed, and then smell it. Does smelling supply new information?

Students can write a sentence about their favorite sense and draw a picture that shows them using that sense.

Discuss:

Would you have any senses without your brain? How does the brain help the entire body to function?

Extension

Discuss what things at the Puyallup Fair can be experienced using the five senses. How many senses are experienced in each example they discuss?

Suggestion: Read the book "Brown Bear, Brown Bear, What Do You See?" and find articles about the senses that can be read to students and discussed.

How does the brain impact your senses?



Chapter 2 Lesson 2

Materials:

Printed optical illusions (print out a minimum of 3 unique optical illusions for each group of students).

Suggestion: There are many optical illusion images on the Internet. These can easily be found by typing "optical illusions" into a search engine.

Lesson Steps:

Ask students, "Do you always know what you are seeing?"

Pass out the optical illusion images one at a time to students.

Ask students to take time to examine the first image. Share what each student sees when they first look at the image.

Encourage students to look again for a longer period of time. Do they see any other images in the picture? If not, guide them to see other interpretations of the image.

Repeat these steps with different optical illusions. Why do they think they immediately interpret the picture to have one image over another? How do our past experiences guide what we see?

Discuss the role your brain plays in interpreting what you see with your eyes. Oftentimes, our brain fills in information based on context. If we put B next to an "A" and a "C," then we assume it's a "B." If it's between "12" and "14," we may think it's a "13."

Show your students a fake object (fake rock, fake feces, fake vomit) and ask them what it is. Then ask how they knew that it was that object (because it looks like that). Explain that they used their sense of sight to figure that out. What other senses could help you determine what this is? Have students use their senses of touch and smell to determine that it is plastic. Our brain integrates the senses to figure out things about the world around us.

Extension

Discuss the above activity with students. "When I showed you the fake rock, you thought it was a rock, but you used other senses to figure out it wasn't a rock. What are other experiences you've had where you used many senses to figure something out?" Examples could include hearing a cow mooing at the Puyallup Fair (we need to see it to know if it's a Holstein or a Brown Swiss) or seeing smoke come off a pot (if it doesn't smell, we know it's just steam and not something burning).

Show the students a diagram of the brain that shows nerve pathways going from the ears, tongue, nose, eyes, and skin into the brain. These pathways go into our brain and give us a more complex understanding of the world around us.

Visit <http://universe-review.ca/I10-13-senses.jpg> to see this brain diagram.

What can you do to give your brain a workout?



Chapter 3 Lesson 1

Materials:

Print out the “Hocus Focus” puzzle from the past several days of The Seattle Times. This puzzle can be found at the back of the B section in the Monday through Saturday newspapers. Students will also need six to eight different colored crayons and tracing paper.

Lesson Steps:

Have students break up into groups of 2 to 4 individuals.

Remind the class of the many things the brain can do. Use the in-paper “AI’s Brain” page from a recent edition of The Seattle Times to discuss ways that you can make the best brain.

Ask students how they think the size of a baby’s brain differs from that of an adult. Have them discuss what this means for “making the best brain” as you get older. What can help you make the best brain? What things can harm your brain?

Puzzles are one way to give your brain a workout and increase your neural connections. Distribute a Hocus Focus puzzle facedown to each group. Explain that there are differences between the two pictures. Have students circle the differences they find on each paper. They should use the same color to circle each difference on the left and the right. For example, if a hat is on the person on the left, but missing from the image on the right, they might use the red crayon to circle both of these in the two pictures. Or, they may use green to show that the plant has four flowers in one image and one in the other.

Have the students work together to solve a few Hocus Focus puzzles. Go over each as a class to make sure they found all of the differences.

Extension

Have each group create their own Hocus Focus puzzle. They should make a left drawing and a right drawing that have three to five differences between them. They can use the tracing paper to copy the original drawing. Then they can exchange their puzzle with another group to try to solve the other group’s puzzle.

Discuss some activities at the Puyallup Fair that can help develop a student’s brain, such as darts, shooting galleries or mutton busting.



Materials:

Make sure each student obtains a copy of the brain maze below, a pencil and paper.

Lesson Steps:

Students should discuss what a maze is and how it works. On the AI's Brain maze, a dotted path shows how to solve it.

Have students use their fingers to trace this path on the brain from left to right. Would the time it took them or the ease they felt while tracing change if they practiced left to right ten times?

Have students practice left to right ten times or more. Did the practice help to make it easier/speed up their time? What was happening in their brains to make this easier? (This is an example of learning, and connections are forming as the students get better and better at the task.)



Extension

Make a new maze that does not have a solution and have the students practice to find the path that takes them through the maze.

Ask students if they have ever gone to a corn maze. What was that experience like?